

June 17, 2002

Board of Directors
J.A. & Kathryn Albertson Foundation
P.O. Box 70002
Boise, ID 83707-0102

Dear Board Members,

The State of Idaho, thanks to the generosity and involvement of the Albertson's Foundation, participated in the *TIMSS 1999 Benchmarking Study for States and Districts*, a continuation of the Third International Mathematics and Science Study. The U.S. Department of Education's National Center for Education Statistics and the National Science Foundation conducted this study in such a way that states and districts within the United States could receive specific information regarding their local data. This allowed us to see our Idaho data in direct comparison to other participating districts, states, and countries in the context of issues related to student achievement, curriculum, instruction, assessment, and student attitudes toward mathematics and science. There is a tremendous range of information regarding our eighth grade student population in the areas of mathematics and science education and there does appear to be some correlation between specific teaching and learning factors and respective student achievement. This information will indeed help direct our efforts and resources in order to improve the teaching and learning of mathematics and science.

The components of the TIMSS 1999 study, or TIMSS-R, consisted of assessments, questionnaires (student, teacher, and school), a Videotape Study, and a Benchmarking Study. The assessment piece entailed an examination composed of multiple choice and open-ended items to measure achievement in mathematics and science. TIMSS-R data for the thirty-eight countries participating in 1999 was released on Dec. 5, 2000. This data reflects various aspects of these countries' educational systems, including their respective demographic characteristics and mathematics and science achievement results. An extensive review of the data was conducted for internal and cross-country consistency. Briefly, United States students' achievement results revealed that our students performed higher than the international average in all content areas but measurement, geometry, and physics. In these areas, our students scored at the international average. The United States was one of thirty-four TIMSS-R countries in which eighth-grade boys and girls had similar performances in mathematics. However, our nation was also one of sixteen TIMSS-R countries in which eighth-grade boys outperformed eighth-grade girls in science. The aforementioned data results, along with all the other TIMSS-R data, are a source of information available to us as we identify our strengths and weaknesses and make decisions about the "where, when, and how" of improvement strategies.

In addition to having United States data as a whole, we now also have Idaho-specific data available to us through the aforementioned *TIMSS-R 1999 Benchmarking Study for States and Districts*. This *Benchmarking Study* involves twenty-seven additional jurisdictions within the United States, consisting of thirteen states and fourteen districts or consortia. These additional jurisdictions followed the same procedures in completing the TIMSS-R assessments as did the thirty-eight participating countries and, thus, are working to assess their international standing and view their mathematics and science programs in an international context. In Idaho, nearly 2000 eighth-grade mathematics and science students completed achievement assessments and related questionnaires during the spring of 1999. The students' mathematics and science teachers and their school principals also completed questionnaires designed to provide contextual data for interpreting the achievement results. The questionnaire and achievement results were released in April 2001. Since then the Idaho State Department of Education (SDE) has been working to analyze the results and is collaborating with the Northwest Regional

Education Laboratory and Dr. William Schmidt of Michigan State University for further in-depth analyses. Personnel from both the SDE and NWREL have attended training seminars conducted by Boston College to learn how to write the computer programs necessary to merge and correlate student achievement and questionnaire databases and results with teacher and principal databases. The preliminary analysis includes the following strengths and weaknesses for Idaho:

Mathematics (5 content areas): **United States average above International average
International average and Idaho not significantly different**

<u>Strengths</u>	<u>Average</u>	<u>Weaknesses</u>
	Fractions and number sense	Geometry
	Measurement	
	Algebra	
	Data representation, analysis, and probability	

Science (6 content areas): **Idaho average above United States average
United States average above International average**

<u>Strengths</u>	<u>Average</u>	<u>Weaknesses</u>
Earth science	Physics	
Life Science		
Chemistry		
Environmental and resource issues		
Scientific inquiry and nature of science		

The mathematics data shows that our Idaho eighth grade students scored the lowest in geometry, followed by measurement, in comparison to other participating districts, states, and countries. Secondary analyses have been done in the area of mathematics regarding questions beginning with the statements: **“How often does this happen in your mathematics lessons?”** and **“When we begin a new topic in mathematics, we begin by ...”** These analyses involved conducting ANOVA significance tests between whether the students answered, **“Almost always,” “Pretty often,” “Once in a while,”** or **“Never”** and their respective achievement scores in the five mathematics content areas. Examples of two items involving instructional practices regarding the question **“How often does this happen in your mathematics lessons?”** reveal the following:

- Measurement is the only math content area that has a significant ANOVA test on item *“We use calculators.”* (*Students answering “Almost always” had higher achievement scores in measurement*)
- Geometry is the only math content area that has a significant ANOVA test on item *“We discuss our completed homework.”* (*Students answering “Almost always” had higher achievement scores in geometry*)

It is interesting to note that there are many instances where geometry is the only math content area that does NOT have a significant ANOVA test on items addressing instructional practices. Therefore, while we must clearly be cautious before drawing premature correlations in specific areas of geometry instruction and student achievement, there is definitely a need for increased attention in the area of geometry. And, although the TIMSS-R was administered to eighth grade students, our Idaho Mathematics Achievement Standards identify geometry concepts to be taught K-12. These instructional strategy issues relating to geometry must be analyzed further, along with instructional strategy, curriculum articulation, technology integration, teacher confidence, and teacher preparation issues in all the content areas.

Keeping in mind that we need to be cautious before attributing any cause and affect relationships, certain items have significant ANOVA tests on the overall achievement scores in *all* of the mathematics content areas (algebra, geometry, fractions and number sense, measurement, and data representation, analysis, and probability).

Specifically, for the following item questions and responses, the overall achievement scores were highest for the indicated responses (**highest relative score and response in parenthesis and in bold**):

“How often does this happen in your mathematics lessons?”

The teacher shows us how to do mathematics problems. (**500.8 for “almost always”**)

We work on mathematics projects. (**506.7 for “once in a while”**)

We work from worksheets or textbooks on our own. (**501.6 for “almost always”**)

We work together in pairs or small groups. (**505.1 for “once in a while”**)

We can begin our homework in class. (**501.2 for “almost always”**)

The teacher gets interrupted by messages, visitors, etc. (**509.7 for “once in a while”**)

The teacher uses a computer to demonstrate ideas in mathematics. (**505.2 for “never”**)

“When we begin a new topic in mathematics, we begin by ...”

Trying to solve an example related to the new topic. (**502.4 for “almost always”**)

The TIMSS-R results have already proved useful in helping the Idaho Department of Education focus on the various issues involved with “middle level mathematics.” This includes helping to support workshops this summer involving the specific areas of geometry and measurement concepts, technology integration, classroom assessment of mathematics performance, and mathematics and science integration. We are also working to identify best practices for long-term, comprehensive professional development workshop and classroom implementation plans. The continuing further analysis and subsequent careful assessment of our Idaho TIMSS-R data has the capacity to assist not only our Department, but also districts in the development of mathematics and science curriculum and in textbook adoption, and school improvement programs in the development of professional development plans identified to meet the needs of schools’ unique student and teacher populations.

Enclosed please find the following Idaho-specific information pertaining to *TIMSS Benchmarking* results:

- TIMSS-R 1999 Preliminary Analysis (April 2001)
- TIMSS-R SDE Press Release (April 5, 2001)
- TIMSS-R PowerPoint slides (October 2001)
- TIMSS-R 1999 Secondary Analysis (February 2002)
- TIMSS-R Analysis Summary (April 2002)

The *TIMSS 1999 Benchmarking Study* data will provide an international backdrop for analyzing Idaho data and will prove to be valuable information in relation to the preparation of our students for their futures. Since the release of the data, many healthy discussions have been and continue to be fostered among all those who care about our Idaho students. In the meantime, more information about the TIMSS-R data for the United States, in relation to other countries, can be found at: <http://nces.ed.gov/TIMSS/TIMSS-R/>. Our state's participation in this study is evidence of our commitment to strengthen the mathematics and science achievement of Idaho students. We are looking forward to continuing to work with you to improve the quality of education for all students in Idaho. Thank you for your involvement and if you have further questions about how Idaho may benefit from having participated in this study, please feel free to contact me.

Sincerely,

Susan Harrington
Mathematics Coordinator

Enclosures

c: Dr. Marilyn Howard
Carolyn Mauer
Tom Farley